DAMPER MOUNTING STRUCTURE FOR WASHING MACHINE

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a damper mounting structure for a washing machine, and more particularly to a damper mounting structure for a washing machine, in which a damper having a buffering function for absorbing oscillation between a drum and a base is installed on the base.

Description of the Related Art

Fig. 1 is a longitudinal-sectional view of a drum-type washing machine having a conventional damper mounting structure. Fig. 2 is a longitudinal-sectional view of the conventional damper mounting structure.

The drum-type washing machine shown in Fig. 1 comprises a cabinet 20 formed in a hexahedral box shape, a tub 6 horizontally positioned in the cabinet 20 for containing wash water, a spring 4 and a damper 6 having a buffering function for supporting the tub 6 to the inside of the cabinet 20, a drum 7 rotatably positioned in the tub 6 for washing laundry, and a motor 9 installed at a rear surface of the tub 6 for rotating the drum 7.

Here, the cabinet 20 includes a cabinet main body 21 for

defining both side surfaces and a rear surface of the appearance of the washing machine, a front cover 22 attached to a front surface of the cabinet main body 21, a top plate 23 attached to a top surface of the cabinet main body 21, and a base 24 attached to a bottom surface of the cabinet main body 21.

The spring 4 for suspensibly supporting the tub 6 is interposed between an upper surface of the cabinet 20 and an upper surface of the tub 6, and the damper 6 having a buffering function is interposed between a lower surface of the tub 6 and the base 24 so that the lower part of the tub 6 is supported by the damper 6.

Particularly, as shown in Fig. 2, the damper 10 includes a cylinder 13 connected to the tub 6, a piston 14 connected to the base 24, and a damping pad 16 installed between the cylinder 13 and the piston 14 for generating frictional force so as to have a damping function.

The cylinder 13 is rotatably connected to a tub bracket 6a fixed to the lower part of the tub 6 by means of a clamping pin 11, and the piston 14 is rotatably connected to a base bracket 24a fixed to the upper part of the base 24 by means of a clamping pin 12.

The damping pad 16 is fixedly attached to an inner circumference of the cylinder 13 or an outer circumference of the piston 14, thus generating frictional force when the

damping pad 16 is moved in respect to the cylinder 13 or the piston 14.

Accordingly, when the damper 10 moves between the cylinder 13 and the piston 14 due to the oscillation of the tub 6 during the operation of the washing machine, the damping pad 16 generates heat energy due to the friction in the cylinder 13, thus attenuating the oscillation of the tub 6.

However, since the base bracket 24a connected to the damper 10 is installed directly on the base 24, in case that the oscillation not absorbed by the damper 10 in the operation of the washing machine is transmitted to the base bracket 24a, the oscillation is transmitted also to the base 24 and the cabinet 20, thus increasing noise and oscillation transmitted to the outside of the washing machine.

SUMMARY OF THE INVENTION

Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide a damper mounting structure for a washing machine, in which buffering means is provided between a cabinet and a bracket connected to a damper, thus reducing oscillation and noise transmitted from the damper to the cabinet during the operation of the washing machine.

In accordance with one aspect of the present invention,

the above and other objects can be accomplished by the provision of a damper mounting structure for a washing machine, comprising: a damper positioned between a tub and a cabinet for supporting the tub; a mounting bracket connected to the damper; and a buffering member provided between the mounting bracket and the cabinet for absorbing oscillation.

Preferably, the mounting bracket may include: a bracket main body having one end connected to the damper by a pin; and a detachment-preventing member provided on the other end of the bracket main body for preventing the buffering member from being detached from the mounting bracket.

Further, preferably, the bracket main body may include: a damper connecting portion connected to the damper by the pin; a buffer connecting portion downwardly extended from the damper connecting portion and connected to the buffering member; and a detachment-preventing portion provided on an end of the buffer connecting portion for preventing the buffering member from being detached from the mounting bracket.

Moreover, preferably, the detachment-preventing member may be a nut locked onto an external thread formed on the bracket main body.

Preferably, the cabinet may be provided with a mounting hole formed therethrough so that the buffering member is inserted into the mounting hole.

Further, preferably, the buffering member may be provided

with a recess formed in an outer circumference thereof so that the recess is inserted into the mounting hole, and a hole formed through a central area thereof so that the mounting bracket is fixedly inserted into the hole.

In accordance with another embodiment of the present invention, the cabinet may include a buffering portion, having a thickness thinner than those of other portions, formed through an area where the buffering member is connected to the cabinet.

In accordance with yet another embodiment of the present invention, the cabinet may include: a hole having a designated size formed through an area where the buffering member is connected to the cabinet; and a buffering plate connected to the buffering member around the hole, and the buffering plate may be made of a material having an elastic modulus lower than that of the cabinet.

In accordance with another aspect of the present invention, there is provided a damper mounting structure for a washing machine, comprising: a damper connected to a tub; a mounting bracket connected to an end of the damper; and a cabinet including buffering means for supporting the mounting bracket such that the buffering member absorbs oscillation transmitted to the mounting bracket.

The damper mounting structure for the washing machine of the present invention comprises the buffering means positioned

between the mounting bracket connected to the damper and the cabinet including the base, thus minimizing the transmission of oscillation of the tub during the operation of the washing machine and allowing the washing machine to be operated in a quiet state.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a longitudinal-sectional view of a drum-type washing machine having a conventional damper mounting structure;

Fig. 2 is a longitudinal-sectional view of the conventional damper mounting structure;

Fig. 3 is a longitudinal-sectional view of a drum-type washing machine having a damper mounting structure in accordance with a first embodiment of the present invention;

Fig. 4 is a longitudinal-sectional view of the damper mounting structure in accordance with the first embodiment of the present invention;

Fig. 5 is a longitudinal-sectional view of a damper mounting structure in accordance with a second embodiment of

the present invention;

Fig. 6 is a longitudinal-sectional view of a damper mounting structure in accordance with a third embodiment of the present invention; and

Fig. 7 is a longitudinal-sectional view of a damper mounting structure in accordance with a fourth embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now, preferred embodiments of the present invention will be described in detail with reference to the annexed drawings.

Fig. 3 is a longitudinal-sectional view of a drum-type washing machine having a damper mounting structure in accordance with a first embodiment of the present invention. Fig. 4 is a longitudinal-sectional view of the damper mounting structure in accordance with the first embodiment of the present invention.

The drum-type washing machine shown in Fig. 3 comprises a cabinet 40 including a cabinet main body 41 and a base 44 attached to a bottom surface of the cabinet main body 41, a tub 56 positioned in the cabinet 40 for containing wash water, a spring 54 and a damper 60 having a buffering function for supporting the tub 56 in the cabinet 40, a drum 57 rotatably positioned in the tub 56 for containing laundry together with

the wash water, and a motor 59 installed at a rear surface of the tub 56 for rotating the drum 57.

Here, the spring 54 supports both sides of an upper portion of the tub 56 so that the upper portion of the tub 56 is suspended by an upper portion of the cabinet main body 41, and the damper 60 supports both sides of a lower portion of the tub 56 so that the lower portion of the tub 56 is fixed to the base 44.

Particularly, as shown in Fig. 4, the damper 60 includes a cylinder 62 connected to the tub 56, a piston 64 inserted into the cylinder 62 such that the piston linearly moves in the cylinder 62 and connected to the base 44, and a damping pad 66 provided between the cylinder 62 and the piston 64 so as to frictionally move the piston 64 in the cylinder 62.

The cylinder 62 has a hollow pipe structure so that the piston 64 is movable within the cylinder 62. An elastic body 63 is integrally attached to an upper end of the cylinder 62, and is connected to a tub bracket 56a integrally formed on both sides of the lower end of the tub 56 by means of a connection pin 67.

The piston 64 has a pipe structure having a diameter smaller than the inner diameter of the cylinder 62 so that the piston 64 is inserted into the cylinder 62 and is linearly movable in the cylinder 62. An elastic body 65 is attached to a lower end of the piston 64, and a mounting bracket 71 and a

buffering member 80 for absorbing oscillation transmitted to the cabinet 40 through the damper 600 are installed between the elastic body 65 and the base 44.

The mounting bracket 71 has a Y-shaped structure. That is, the mounting bracket 71 includes a damper connecting portion 72 positioned at both sides of the elastic body 65 for connecting the elastic body 65 thereto by a connection pin 68, a buffer connecting portion 73 having a long rod structure downwardly extended from the central portion of the damper connecting portion 72 and connected to a buffering member 80, and a detachment-preventing portion 73a provided on an end of the buffer connecting portion 73 for preventing the buffering member 80 from being detached from the mounting bracket 71.

An external thread is formed on the external surface of the detachment-preventing portion 73a of the mounting bracket 71, and a nut 74 serving as a detachment-preventing member is locked onto the detachment-preventing portion 73a provided with the external thread, thus preventing the buffering member 80 from being detached from the mounting bracket 71. Preferably, a washer 75 is inserted between the nut 74 and the buffering member 80 so as to maintain fixation between the nut 74 and the buffering member 80.

A mounting hole 44a is formed through the base 44 of the cabinet 40 so that the buffering member 80 is inserted into the mounting hole 44a.

The buffering member 80 is made of an elastic material such as rubber so as to absorb oscillation. A hole 81 is formed through the central area of the buffering member 80 so that the buffer connecting portion 73 of the mounting bracket 71 is fixedly inserted into the hole 81, and a recess 83 is formed in the outer circumference of the buffering member 80 so that the buffering member 80 is inserted into the mounting hole 44a of the base 44.

Hereinafter, function of the damper mounting structure in accordance with the first embodiment of the present invention will be described in detail.

First, the elastic body 63 at the side of the cylinder 62 of the damper 60 is connected to the tub bracket 56a of the tub 56 by means of the connection pin 67, and the elastic body 65 at the side of the piston 64 of the damper 60 is connected to the mounting bracket 71 by means of the connection pin 68.

Thereinafter, under the condition that the buffering member 80 is inserted into the mounting hole 44a of the base 44, one end of the buffer connecting portion 73 of the mounting bracket 71 is inserted into the hole 81 of the buffering member 80 and the other end of the buffer connecting portion 73 is inserted into the washer 75, and then, the nut 74 is locked onto the detachment-preventing portion 73a. Thereby, the buffering member 80 is assembled with the mounting bracket 71 such that the buffering member 80 is compressed in an axial

direction without detachment from the mounting bracket 71.

After the damper 60 is installed between the tub 56 and the base 44 in the above-described manner, the drum-type washing machine is operated, and the motor 59 operates the drum 57 to be rotated so that laundry positioned in the drum 57 is cleaned. When the drum 57 is rotated so as to clean the laundry therein, the tub 56 generates oscillation. Here, the spring 54 and the damper 60 support the tub 56, thus absorbing the oscillation of the tub 56.

As the tub 56 oscillates, the cylinder 62 and the piston 64 of the damper 60 move in respect to each other. Here, the oscillation of the tub 56 is attenuated by frictional force generated by the damping pad 66 of the damper 60.

Particularly, since the damper 60 is elastically fixed to the base 44 by means of the mounting bracket 71 and the buffering member 80, although the oscillation of the tub 56 is transmitted to the piston 64 and the mounting bracket 71, the buffering member 80 absorbs the transmitted oscillation, thereby minimizing oscillation and noise transmitted to the base 44.

Accordingly, the damper mounting structure of the present invention minimizes the transmission of oscillation generated from the tub 56 during the operation of the washing machine to the base 40 including the base 44, thus reducing the generation of noise during the operation of the washing machine.

Fig. 5 is a longitudinal-sectional view of a damper mounting structure in accordance with a second embodiment of the present invention.

The damper mounting structure in accordance with the second embodiment is essentially similar to the earlier-described damper mounting structure in accordance with the first embodiment, except that the base 44 of the cabinet 40 has a different structure.

That is, the base 44 includes the mounting hole 44a connected to the buffering member 80, and a base buffering portion 44b having a thickness thinner than those of other portions around the mounting hole 44a.

The base buffering portion 44b of the base 44 has the thickness thinner than those of other portions of the base 44, thus serving to more greatly attenuate oscillation transmitted from the tub 56 to the base 44 through the buffering member 80.

Other parts of the above damper mounting structure shown in Fig. 5 except for the base 44 are substantially the same as those of the damper mounting structure in the first embodiment and are thus denoted by the same reference numerals even though they are depicted in different drawings, and detailed descriptions thereof will be omitted because they are considered to be unnecessary.

Fig. 6 is a longitudinal-sectional view of a damper

mounting structure in accordance with a third embodiment of the present invention.

The damper mounting structure in accordance with the third embodiment is essentially similar to the earlier-described damper mounting structure in accordance with the second embodiment, except that the base 44 of the cabinet 40 has a different structure.

That is, the base 44 includes an expanded hole 44a' having a designated size installed at an area through the mounting bracket 71 and the buffering member 80 pass, and a buffering plate 45 connected to the buffering member 80 around the hole 44a' is laid on the base 44.

Preferably, the buffering plate 45 is made of a material having an elastic modulus lower than that of the base 44 so as to have an additional buffering function, and is laid on the upper surface of the base 44 and fixed to the base 44 by a bonding or welding method or using a locking member.

A mounting hole 45a is formed through a central area of the buffering plate 45 so that the buffering member 80 is inserted into the mounting hole 45a.

In the damper mounting structure in accordance with the third embodiment in the same manner as the second embodiment, the buffering plate 45 serves to more greatly attenuate oscillation transmitted from the tub 56 to the base 44.

Other parts of the above damper mounting structure shown

in Fig. 6 except for the base 44 are substantially the same as those of the damper mounting structure in the first embodiment and are thus denoted by the same reference numerals even though they are depicted in different drawings, and detailed descriptions thereof will be omitted because they are considered to be unnecessary.

Fig. 7 is a longitudinal-sectional view of a damper mounting structure in accordance with a fourth embodiment of the present invention.

Differently from the earlier-described damper mounting structures in accordance with the first to third embodiments, the damper mounting structure in accordance with the fourth embodiment comprises a mounting bracket 171 installed directly on a base 144 and the base 144 includes a buffering portion.

That is, the base 144 includes a base buffering portion 145 having a thickness thinner than those of other portions of the base 144, thus allowing the base buffering portion 145 to attenuate oscillation transmitted to the base 144 through the mounting bracket 171.

Further, the mounting bracket 171 is formed in a U shape so that the damper 60 is connected to the mounting bracket 171 by means of the connection pin 68, and a lower surface of the mounting bracket 171 is fixedly attached to the base buffering portion 145 by a welding method, or etc.

Instead of the base buffering portion 145, a buffering

plate (not shown), as described in the third embodiment, made of a material having an elastic modulus lower than that of the base 144 may be installed on the base 144. Here, the mounting bracket 171 is fixed directly to the buffering plate.

Other parts of the above damper mounting structure shown in Fig. 7 except for the base 144 are substantially the same as those of the damper mounting structure in the first embodiment and are thus denoted by the same reference numerals even though they are depicted in different drawings, and detailed descriptions thereof will be omitted because they are considered to be unnecessary.

As apparent from the above description, the present invention provides a damper mounting structure for a drum-type washing machine, comprising buffering means positioned between a base and a mounting bracket connected to a damper, thus minimizing the transmission of oscillation generated from a tub to a cabinet during the operation of the washing machine and allowing the washing machine to be operated in a quiet state.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.